Assignment 3 - WebGL

CSE251 - Graphics, Spring 2017

Due: Feb 27th, 5 PM.

1 The Problem

Interactive Aquarium Simulator. A simulation of a small aquarium with multiple objects/fish inside performing various actions. Allows the user to interact with the simulator in multiple ways which will be described below. The requirements mentioned are minimal, you can be creative and add any features you find interesting.

2 The Tank

A 3D tank with a sky-box texture/image which can be uploaded by user which would be applied dynamically during the simulation. Have different types of fishes moving around with different speeds, having different sizes, with their own animations(need not be fishes, can be any aquatic animal or object). Must contain stones and sea weed at the bottom. The tank must be large enough to fit at-least 6 fish which can move around freely.

3 Cameras

There must be 3 types of cameras

1. Free view: Allow the camera to move anywhere inside the tank using mouse and keyboard controls.
2. Fish eye view: From the eyes of a fish, similar to a fish eye lens. Use LEFT and RIGHT arrow keys to switch between fishes. Press 'f' to toggle the fish eye effect.
3. Fish head view: Third person view while controlling a fish.

4 Controls and Specifics

The fish can move only in the forward direction. Forward direction must be controlled by mouse when in fish view, The rest of the fish move randomly (but smoothly). Left mouse button to drop food at a random location from the top of the aquarium. Fish must then reach for the food and eat it. Right mouse button must generate a bubble randomly at the bottom which will rise to the top scaring away all the fish near it. The food and the bubbles must be destroyed after reaching the top/bottom respectively and only one one instance of each is allowed to exist at a time. In fish view, pressing 'e' will make it lay an egg which must hatch in 3-5 secs. The baby fish, initially has $1/4^{th}$ size of its parent and must slowly grow to its full size in 15-20 secs. Pressing 'q' in fish view must kill the fish.

5 Requirements

1. Have at-least 2 kinds of fishes.
2. Have at-least 2-3 fish of each kind.
3. Fish must move randomly when not controlled by the user. Make this movement seem as natural as possible. Avoid sudden changes in direction/speed etc when they move.
4. Food dropped from the top of the aquarium must slowly drift downwards attracting the fish towards it. As the fish eat, it should slowly disappear.
5. Stones, pebbles and sea weed must be present at the bottom of the aquarium.

6. Bubbles raising from the bottom of the aquarium must lift up any stones/pebbles on its path and take it to the top. Once the bubble reaches the top, its bursts and the stone slowly drifts back down. The stone may also fall off during the process based on its center of mass/angular momentum.

7. Animations and sounds for all the actions/details mentioned above. Make the sea weed wave around gently, bubbles pop when they reach the top, moving fins on the fish as they swim around etc. Be as creative as possible.

6 Optional

Add a small world outside the tank and allow the 'Free View' camera to move outside the tank as well. Allow the user to take a screen-shot of the aquarium in its current state and view. Add more objects/animals/props to the aquarium such as an oxygenator for the tank or small toys like a submarine etc. Random generation of skins/textures for the fish. Add small particle systems to show various effects within the aquarium such as the food crumbling or small water waves/twirling water etc. An egg that is spawned must drop slowly to the bottom and then hatch over time to give rise to a small baby fish that slowly grows up.

7 Submission

You submissions should include your source code. You need to include instructions on the same page under the canvas that describe any additional information that is needed. In addition to these, include a file named help.txt or help.pdf (no word or other proprietary formats) in the submission that gives a one page description of the game and how to play it.

8 Grading

You will be graded based on the correctness of the implementation of the minimum requirements described above. This will contribute to 80% of your grade. Remaining 20% will be given based on the improvements that you do over the basic game (Optional). In addition, submissions that are found to be exceptional by the graders, will be showcased, and will be awarded extra credits up to 10%.

9 References

You can have a look at these games for inspiration Roblox Aquarium Simulator, Insaniquarium and FishTycoon.